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GOVERNMENT OF GOA

Industries and Labour Department

Notification

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The following draft rules which the Government of Goa proposes to make in exercise of the powers conferred by section 29 of the Inland Vessels Act, 1917 (Central Act 1 of 1917), are hereby republished as required by sub-section (1) of section 74 of the said Act, for the information of all persons likely to be affected thereby and notice is hereby given that the said draft rules will be taken into consideration after thirty days from the date of publication of this Notification in the Official Gazette.

All objections and suggestions to the draft may be forwarded to the Secretary, Industries and Labour Department, Government of Goa, Secretariat, Panaji, before the expiry of thirty days from the date of publication of this Notification in the Official Gazette.

DRAFT RULES

In exercise of the powers conferred by section 29 of the Inland Vessels Act, 1917 (Central Act 1 of 1917), the Government of Goa hereby makes the following rules, namely.—

1. **Short title and commencement.**—(1) These rules may be called the Goa examination and grant of certificate of competency to Masters, Serangs, Inland Engineers and Engine Drivers of Inland Mechanically Propelled Vessels Rules, 1987.

(2) They shall come into force at once.

2. **Certificates granted to persons who pass examination.**—Certificates of Competency shall be granted to those persons who pass the requisite examinations and otherwise comply with the requisite conditions. For this purpose Examiners shall be appointed and arrangements shall be made for

holding examinations whenever necessary at the Ports of Panaji and Mormugao.

3. **Date and time of examination.**—The examination shall be held by previous appointment on all week days except on Sundays and other holidays, between 10 a. m. and 5 p. m.

4. **Application how to be made.**—Candidates for examination shall make their application in Form No. 1 appended to those rules which must be filled up at the Captain of Ports Office, Panaji or Mormugao. The Form properly filled in, together with the candidate's testimonials and discharges, shall be lodged with the President of the Board of Examiners not later than seven days before the day of examination.

5. **Testimonials required.**—Testimonials of character and of sobriety, experience, ability and good conduct on board the vessels and at least twelve months service preceding the date of application to be examined, shall be required from all applicants. Applicants who have not served on board a vessel, within the last twelve months shall be required to produce in addition to the testimonials hereinbefore mentioned, certificates of a like nature from their employers, or, if unemployed, from some respectable householder. No candidate shall be allowed to be examined unless he has served on board a vessel at sea or on inland waters two years within the last six years and six months within the last three years, preceding the date of his application to be examined.

6. **Verification of service.**—For all grades of certificates, service in capacities other than those belonging to the Department i. e. as cook, steward, clerk, carpenter, etc., for which the candidate is to be examined shall not be accepted.

Testimonials of service must ordinarily be based on the employer's office records.

Services claimed which cannot be verified from the employer's office records must be authenticated by affidavits of persons under whom such service have been performed as well as by an affidavit of the candidate himself.

7. **Certificate as to age.**— If any doubt arises as to the age of a candidate, he shall be required to produce a certificate of birth or baptism.

8. **Gaps in service.**— Candidate shall be required to account for any gaps in their services with documentary evidence.

Sight Tests

9. (a) **Prescribed tests.**— Every candidate for a deck certificate of competency shall pass the prescribed sight test before a certificate can be issued to him. If circumstances render it necessary for him to proceed with the examination in navigation and seamanship before undergoing the sight tests, he shall be informed that the examination in navigation and seamanship shall be cancelled in the event of his failure to pass either of the sight tests.

Notes:— Detailed information with regards to the conduct of examination and standards required is contained in Appendix A.

(b) **Letter test.**— Every candidate for a deck certificate of competency shall undergo the letter test. He shall be required to pass a Higher standard viz. normal vision using both eyes or either eye separately.

(c) **Lantern test.**— Every candidate for a deck certificate of competency shall undergo the lantern tests on every occasion on which he presents himself for examination for his first certificate of competency; but if he then passes, he shall not be required to undergo lantern tests on any subsequent occasion.

(d) **Passing or failure in examination-letter test.**— If the candidate passes the letter test, he shall be required to undergo the lantern test, unless, he holds a certificate of competency. If he fails in the letter test, he may—

(i) proceed to the lantern test in which case the result of both tests will be taken into consideration in deciding whether is to be passed, or

(ii) break off the examination and present himself for re-examination in not less than three months time.

(c) **Lantern test.**— If the candidate passes the lantern test after passing the letter test, he shall be deemed to have passed the examination.

If the result of the lantern test is inconclusive, or if the candidate passes it after failing in the letter test, his case shall be submitted to the Captain of Ports, Panaji, who shall decide whether he has passed or failed, or whether he shall be referred for a special examination.

If the candidate fails to pass a lantern test, the examiner shall point out to him the conditions stated in sub-rule (g) under which he can appeal. Appeals shall be made through the Captain of Ports, and forwarded to the Government, with the Examiner's remarks.

A candidate who fails to pass the lantern test, shall not be re-examined unless the Captain of Ports decides that he may be re-examined after a lapse of

three months. A certificate shall be issued to the candidate stating whether he may or may not be re-examined.

(f) **Special examination.**— In the case of a candidate who is referred for further examination, the Captain of Ports shall make arrangements for a special examination for which no additional fee shall be charged.

(g) **Appeal cases.**— A candidate who is adjudged to have failed in the lantern test may appeal to the Government, which may if it deems fit, remit the case to a special body of examiners for decision. Such candidates shall be required to pay a special fee of Rs. 50/- which shall be returned to him if he is declared to have passed the special examination.

(h) **Candidates to attend punctually for special examination.**— Candidates who are referred to for a special examination or who appeal against the result of the local tests shall be notified by the Government of the time at which they should attend for special examination and should inform the Captain of Ports whether or not they will be able to attend at that time. Any candidate who, after informing the Captain of Ports that he will attend, fails to appear at the time appointed, shall be liable to have his examination postponed indefinitely, and also if he has appealed under sub-rule (g), shall forfeit the appeal fee of Rs. 50/- and shall be required to deposit a further fee of the same amount before further arrangements are made for his special examination.

(i) **Failure in special examination.**— where during the course of a special examination, a candidate who has appealed or has been referred under sub-rule (f) is found to have a permanent defect in his eye-sight, such as to render him unfit for a sea career, he shall be finally rejected and shall not be allowed to be examined again in the sight test on any future occasion:

Provided that if the candidate is still dissatisfied it shall be open to him, if he so desires, to present himself for a second special examination on payment of a fee of Rupees seventy-five. Such candidate shall be required to bring with him a friend to witness the examination.

A second examination under this sub-rule shall be entirely voluntary and shall form no part of the examination for a certificate of competency. The Government may take into consideration the result of such examination in determining whether a certificate shall be granted.

The special appeal fee of Rupees seventy-five shall not be refundable unless, in the special circumstances of an individual's case, the Government thinks fit to refund it.

Qualifications for Certificates of Competency as Serang

10. **Examination in prescribed sight tests.**— All candidates for certificate of competency as Serang must first be examined in prescribed sight tests.

11. **Age.**— A candidate for a certificate of competency as Serang of an inland vessel shall be not less than 25 years of age and shall produce satisfactory testimonials of sobriety and intelligence.

12. Qualifications. — (i) Such candidates must have minimum qualification of eighth standard of English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(ii) Such candidates who desire to appear for the examination of Competency as Serang should undergo Advance/Refresher training course in the Maritime School Britona, the candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(iii) Such candidates must have five years of service, at sea or on Inland Waters one year of which service must be as helmsman or as Assistant Master or Sukani or total of 8 years's service as Sailor, and should have performed at least six months service on board of vessel, plying in the port/inland rivers, of the Territory where the candidate is appearing for the examination of Serang and shall be examined in the following subjects:

- (a) the rules of the road as regards both sailing vessels and mechanically propelled vessels, their regulation, lights, fog and sound signals,
- (b) the marking and use of the load line and knowledge of the compass,
- (c) management of a boat under oars or sail,
- (d) steps to be taken in the event of a vessel grounding,
- (e) management of inland vessels under all conditions,
- (f) management of inland vessels under tow or when towed,
- (g) practical questions on carriage of iron ore,
- (h) the provisions of the rules made by Captain of Ports in respect of Life Saving and Fire Appliances and general discipline.

13. Failure. — If a candidate fails in an examination for a certificate of Competency as serang, he shall not be re-examined till he has rendered additional services for three months as helmsman, or Assistant Master or Sukani.

Qualifications for Certificate of Competency as Second Class Master

14. Examination in prescribed sight tests. — All candidates for certificates of competency as Second Class Master shall first be examined in prescribed sight tests.

15. Age. — A candidate for a certificate of competency as Second Class Master of an Inland Vessel shall be not less than 27 years of age and shall produce testimonials of sobriety and intelligence.

16. Qualifications. — (i) Such candidates must have minimum qualification of Eighth Standard of English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(ii) Such candidates who desire to appear for the examination of Competency as 2nd Class Master should undergo Advance Refresher training course

in the Maritime School Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(iii) Such candidates must have served at least six years at sea or on inland waters, three years of which service must have been served as Helmsman/Sukani of Inland vessel having not less than 50 N.H.P./282 BHP or two years service of Serang and one year service as Helmsman of an Inland motor vessel having not less than 20 NHP or 113 BHP. A candidate for certificate of competency as Second Class Master shall be examined *viva voce* in the following subject: —

- (a) Management of inland vessels and inland mechanically propelled vessels under all conditions,
- (b) knowledge of storm and distress signals,
- (c) knowledge of the compass,
- (d) knowledge of Inland waters of Goa, its anchorages, shoals, buoyage, beacons, lights and other such matters.

17. Failure. — If a candidate fails in an examination for a certificate of competency as Second Class Master, he shall not be re-examined till he has rendered additional service for three months as helmsman of a vessel of not less than 50 nominal horse power or as Scrang in charge of an inland vessel of not less than 20 nominal horse power.

18. Certificate of lower grade. — If a candidate has failed in any examination, but the subjects in which he has failed are not included in the subjects required for a certificate of lower grade, he may, if he so desires it, receive a certificate of such lower grade.

19. No refund of fee permitted. — The fee which the candidate has paid shall not be refunded to him and on presenting himself, when entitled so to do, for re-examination for the higher grade of certificate he shall be required to pay the full fee again.

Qualifications for certificates of Competency as First Class Master

20. Examination in prescribed sight tests. — All candidates for certificates of competency as First Class Master shall first be examined in prescribed sight tests.

21. Age. — A candidate for a certificate of competency as First Class Master of an Inland Vessel shall not be less than 29 years of age and shall produce testimonials of sobriety and intelligence.

22. Qualifications. — (i) Such candidates must have minimum qualification of eighth standard of English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(ii) Such candidates who desire to appear for the examination of Competency as 1st Class Master should undergo Advance Refresher training course in the Maritime School Britona. The candidate is required to produce the said certificate for verifica-

tion. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(a) As Master of a vessel of not less than 40 nominal horse power for a period of not less than 3 years, while holding a certificate of Competency as Second Class Master; or

(b) As Master of a self propelling dredger of not less than 40 nominal horse power for not less than one year and as Master of an Inland or Home Trade Vessel or of a self propelling dredger of not less than 100 nominal horse power, for a period of not less than 3 years; or

(c) As Assistant Master of a vessel of not less than 100 nominal horse power, while holding a certificate of competency as Second Class Master for a period of not less than 3 years.

23. **Additional knowledge.** — In addition to the knowledge required for the grades of Serang and Second Class Master, a candidate for certificate of Competency as First Class Master shall be examined in *viva voce* in each of the following subjects: —

(a) knowledge of tide-tables and effects of currents,

(b) Knowledge of Hydrographic Charts of Inland waters of Goa,

(c) how to turn a vessel of any size or type short round, bring her to an anchor and get underway, also how to bring a vessel alongside a jetty, pier or wharf and take her off again and precautions to be taken with regard to engines. Handling of twin screw vessels, writing of log books and weather, loading of ore cargo and other general cargoes,

(d) knowledge of Fire Fighting appliances, Light and Sound Signals, Life Saving Appliances and their uses,

(e) knowledge of Inland Vessels Act, 1917 (Central Act of 1917), and the rules framed thereunder,

(f) knowledge of Mormugao and Panaji Port Rules and also Customs Regulations in so far as they are applicable to Inland mechanically propelled vessels.

(g) signalling: Recognition of Alphabet and numbers through the international Code of Flags and Morse, use of ensign flag,

(h) working knowledge of English or Hindi or Marathi or Gujarathi with minimum qualification of eighth standard and knowledge of the regional language.

(i) seasons and General Weather of the area throughout the year,

(j) he should be fully conversant with the use of Mariner's Compass and be able to make use of weather reports issued for the area,

(k) towage.

24. **Failure.** — If a candidate fails in an examination for a Certificate of Competency as First Class Master, he shall not be re-examined till he has rendered additional service for six months.

25. The examiner may call for a report on medical check-up of a candidate for certificate of competency as First Class Master from the nearest Government Hospital or Doctor before examining him.

Qualifications for Certificates of Competency as Second Class Engine Drivers of Inland Steam Vessels

26. **Age.** — A candidate for a certificate of Competency as Second Class Engine Driver must have attained the age of 25 years.

27. **Qualifications.** — (i) Such candidates must have minimum qualification of Eighth Standard of English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(ii) Such candidates who desire to appear for 2nd Class Engine Driver Examination should undergo Advance Refresher training course in the Maritime School Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(a) as an apprenticeship of at least three years in the making or repairing of steam-engines and one year in the engine room of an steamer or inland mechanically propelled vessel,

(b) four years in the engine-room of a steamer of not less than 20 nominal horse power at sea, or on inland waters under a certificated engineer of first-class engine driver one year of which service must have been as a serang or tindel or Asstt. Driver, or

(c) five years in the engine-room of a steamer at sea or on inland waters; one year of this period must have been as a tindel or principal fireman when one only is employed in a vessel of not less than 15 nominal horse power; or

(d) for two years in charge of the engines of a factory or mill under a certificated engineer as well as one year in the engine-room of a steamer as Serang or tindel or principal fireman when one only is employed.

28. **Additional qualifications.** — Such candidate shall also satisfactorily pass a *viva voce* examination as to the working of marine engines and boilers and the uses of the different parts and fittings also as to the use of brine cocks, the saline-meter and blowing off, the care of boilers in salt or foul water, and the care of economical stoking and prevention of smoke.

29. **Practical test.** — Such candidates must be able, if required to show his practical qualifications by actually working the engines of a small steamer, after fulfilling all the other tests to which he shall be subjected.

Qualifications for Certificates of Competency as First Class Engine Drivers of Inland Steam Vessels

30. **Age.** — A candidate for a certificate of competency as First Class Engine Driver shall have attained the age of twenty-seven years.

31. **Qualifications.** — (i) Such candidates must have minimum qualification of Eighth Standard of

English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(ii) Such candidates who desire to appear for the examination of Competency as First Class Engine Driver should undergo Advance Refresher training course in the Maritime School Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(a) as an apprenticeship of three years in the making or repairing of steam engines, and one year as assistant engineer, in a steamer having engines of not less than 80 nominal horse power whilst holding a second class engine-driver's certificate; or

(b) for at least six years in the engine-room of a steamer at sea or on inland waters, two years of which service must have been as a serang or principal tindel of a steamer having compound surface condensing engines of not less than 30 nominal horse power whilst holding a second class engine-driver's certificate; or

(c) for one year as second driver with a second class engine driver's certificate in charge of watch on the main engines and boilers of a steamer having compound surface condensing engines of not less than 30 nominal horse power; or

(d) for one year with a second class engine-driver's certificate as driver in charge of the engines of a steamer having compound surface condensing engine of not less than 20 nominal horse power, or

(e) for eighteen months as serang or principal tindel with a second class engine-driver's certificate in charge of watch on the main engines and boilers of a steamer having compound surface condensing engines of not less than 30 nominal horse power; or

(f) for three years in charge of the engines of a factory or mill under a certificated engineer, as well as two years as assistant engineer, serang or principal tindel of steamer having engines of not less than 80 nominal horse power whilst holding a second class engine-driver's certificate.

32. Testimonials required. — Such candidate must have the testimonials shown in Appendix B filled up by the engineer with whom he has last served, or his other testimonials must contain all the particulars therein required.

33. Additional qualifications. — Such candidate shall pass a viva voce examination similar to that required by rule 28 for a second class engine-driver's certificate but of a more advanced character.

34. Practical test. — Such candidate shall also be able, if required, to show his practical qualifications by actually working the engines of a steamer after fulfilling all the other tests to which he shall be subjected.

Qualifications for Certificates of Competency as Engineers of Inland Steam Vessels

35. Age. — A candidate for a certificate of competency as engineer shall not be less than twenty-nine years of age.

36. Qualifications. — (i) Such candidates must have minimum qualification of Eighth Standard of English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(ii) Such candidates who desire to appear for the examination of Competency as Engineer should undergo Advance Refresher training course in the Maritime School Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(a) have served as an apprentice engineer for four years and prove that during the period of his apprenticeship he has been employed on the making or repairing of steam engines, boilers or in any such capacity.

Journeymen's time shall be considered as equivalent to apprenticeship

In addition to the apprenticeship described above, the applicant shall have served two years thereafter as assistant engineer in a steamer having engines of not less than 80 nominal horse power or with a first class engine-driver's certificate as driver in charge of the engines of a steamer having compound surface condensing engines of not less than 30 nominal horse power, or failing the above service he shall have served four years with a first class engine driver's certificate, in charge of the engines of an inland vessel having compound surface condensing engines of not less than 30 nominal horse power;

(b) be able to give a satisfactory description of boilers, and the methods of staying them, together with the use and management of the different valves, cocks, pipes and connections;

(c) understand how to correct defects from accident, decay, etc. and the means of repairing such defects;

(d) understand the use of the water-gauge, pressure gauge, barometer, thermometer and salinometer, and the principles on which they are constructed;

(e) state the causes, effects, and usual remedies for incrustation and corrosion;

(f) be able to explain the method of testing and altering the settling of the slide valves, and method of testing the fairness of shafts and adjusting them;

(g) be able to calculate the suitable working pressure for a steam boiler of given dimension, and the stress, per square inch, on crank and tunnel shafts when the necessary data are furnished;

(h) understand the construction of steering engines evaporators, food filters and food heaters;

(i) understand the construction of centrifugal bucket, and plunger, pumps and the principle on which they act;

(j) be able to state how a temporary or permanent repairs could be effected in case of derangement of a part of the machinery, or a total breakdown;

(k) write a legible hand, and have a good knowledge of arithmetic up to and including vulgar and decimal fractions and square and cube roots. He must also understand the application of these rules to questions about safety valves, coal consumption, consumption of stores, capacities of tanks, bunkers, etc.

(l) be able to pass an examination as to the various constructions of paddle and screw engines in general use, as to the different working parts, external and internal, and the use of each part;

(m) possess a fair knowledge of the prominent facts relating to combustion, heat and steam.

(n) have a fair knowledge of the rudiments of projection and be able to make a dimensioned working drawing of some simple part of the machinery with which he ought to be familiar or to complete and develop a given example. Drawing boards and T-squares shall be provided, but candidates shall have to bring with them any drawing instruments they require.

Qualifications for Certificates of Competency as Second Class Engine-Drivers of Inland Motor Vessels

37. **Age.** — A candidate for a certificate of competency as second class engine-driver of an inland motor vessel shall not be less than the age of 25 years.

38. **Qualifications.** — (i) Such candidates must have minimum qualification of Eighth Standard of English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(ii) Such candidates who desire to appear for examination of Competency as second class Engine Driver of an inland motor vessels should undergo Advance Refresher training course in the Maritime School Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(a) he must have served for not less than three years as an apprentice or journeyman in the making, fitting and/or repairing of internal combustion or marine steam engines and in addition he must have served for six months in the engine-room of a motor vessel having engines of not less than 85 brake horse power or nine months in a vessel with engines of not less than 40 brake horse power; or

(b) for a period of not less than four years in the engine-room of a motor vessel of not less than 226 brake horse power, of which period not less than one year must have been served as serang, principal tindel or chief greaser or assistant driver or oilman; provided that of the four years mentioned above, one-third may be served in the engine-room of a steam vessel of not less than 40 nominal horse power; or

(c) for a period of not less than five years in the engine-room of a motor vessel having engines of not less than 85 brake horse power, or six years in the engine-room of a vessel having engines of not less than 40 brake horse power of

which period not less than one year must have been as serang, tindel or chief greaser or assistant driver or oilman:

Provided that of the five and six years service mentioned above one-third may be served in the engine-room of a steam vessel of not less than 10 nominal horse power; or

(d) for a period of not less than two years in charge of the engines of a factory or mill under a certificated engineer, as well as for a period of not less than one year in the engine-room of a motor vessel of not less than 85 brake horse power; or 18 months in a motor vessel having engines of not less than 40 brake horse power, as serang, tindel or chief greaser or assistant driver or oilman; or

(e) for at least 6 months with a second class engine-driver certificate for steam vessels or with a certificate of a higher grade in the engine-room of a motor vessel having engines of not less than 85 brake horse power or for nine months in a motor vessel having engines of not less than 40 brake horse power; or

(f) for at least two years, whilst in possession of a permit, as an engine-driver of an inland motor vessel having engines of 40 brake horse power or under followed by three years service in the engine-room of motor vessel having engines of more than 40 brake horse power as serang, tindel or chief greaser, or assistant driver or oilman:

Provided that when the candidate produces proof of long service with a permit in launches having engines of 40 brake horse power or under, remission of service with engines of over 40 brake horse power may be allowed in the ratio of one year in lower powered launches in lieu of six months service higher powered launches with a maximum remission of 18 months. The service to count for remission must be in excess of the two years required in launches of 40 brake horse power or under.

39. **Additional qualifications.** — Such candidate shall: —

(a) satisfactorily pass a viva voce examination on the working of the various types of internal combustion engines and be able to name the principal parts of machinery;

(b) know what attention is required by the various parts of the machinery, understand the use and management of the different valves, cocks, pipes and connections, and be familiar with the various methods of supplying air, and fuel to the cylinders.

(c) be able to describe the chief causes which may make the engine difficult to start and explain how he would proceed to remedy any defects connected therewith; he shall also be able to show that he understands the mechanism of the starting and reverting arrangements and that he is competent to deal with defects therein;

(d) be able to overhaul an engine, to adjust the working parts and to put the engine together again in good working conditions. He shall also understand how to make good the result of ordinary

wear and tear to the machinery and how to correct defects from accidents;

(e) be familiar with the nature and properties of the various fuel oils used in internal combustion engines. He must understand what is meant by flash point; and

(f) know the danger resulting from leakage from the fuel oil tanks and must understand the precautions to be taken against explosion. He shall also be able to take the necessary precautions to guard against the escape of inflammable vapour from the vapourizer when the engines are stopped. He must know how to deal with fire, should it break out.

40. Practical test. — The candidate shall also be able, if required, to show his practical knowledge by actually working the engines of a motor vessel in the presence of the Examiner.

Qualifications for Certificates of Competency as first Class Engine-Drivers of Inland Motor Vessels

41. Age. — A candidate for a certificate of competency as first class Engine-Driver of an inland motor vessel shall attain the age of 27 years.

42. Qualifications. — (i) Such candidates must have minimum qualification of Eighth Standard of English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(ii) Such candidates who desire to appear for examination of Competency as first class engine driver of an inland motor vessel should undergo Advance Refresher training course in the Maritime School Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

He must have served —

(a) for a period not less than one year as engine-driver on regular watch on the main engines of a motor vessel of not less than 565 brake horse power, while holding a second-class engine-driver's certificate for motor vessels; or

(b) for a period of not less than 18 months as second driver with a second class engine-driver's certificate of motor vessels in charge of a watch on the main engines of a motor vessel of not less than 226 brake horse power; or

(c) for a period of not less than four years in the engine room of a motor vessel of not less than 226 brake horse power of which period not less than one year must have been served as a chief greaser, serang or principal tindel or assistant driver or oilman; whilst holding a second class engine-driver's certificate for motor vessels.

If the motor vessel is of not less than 170 brake horse power he must have served at sea or on inland waters for a period of not less than five years in such vessel, of which period not less than two years must have served as a serang, principal oilman or chief greaser or assistant driver, whilst holding a second class engine-driver's certificate for motor vessels; or

(d) for a period of not less than 18 months with a second class engine driver's certificate for motor vessels as driver in charge of the engine of a motor vessel of not less than 113 brake horse power; or

(e) for not less than two years as a serang, principal tindel, or chief greaser or assistant driver or oilman with a second class engine-driver's certificate for motor vessels in a motor vessel of not less than 226 brake horse power; or

(f) for not less than three years in charge of the engines of a factory or mill under a certificated engineer as well as for not less than one year in the engine-room of a motor vessel of not less than 226 brake horse power, as assistant engineer, serang, principal tindel or chief greaser or assistant driver or oilman whilst holding a second class engine driver's certificate for motor vessels; or

(g) for not less than two years as engine-driver on regular watch on the engines of a motor vessel of not less than 226 brake horse power, whilst holding a first class engine driver's certificate granted under the Act; or

(h) for not less than four years as engine-driver on regular watch on the main engines of a motor vessel of not less than 226 brake horse power whilst holding a second class engine driver's certificate granted under the Act; or

(i) hold an engine-driver's certificate for sea-going ships granted under the Merchant Shipping Act, 1958 and must have served on regular watch on the main engines of the motor vessels of not less than 226 brake horse power for a period of not less than one year.

43. Additional qualifications. — Such candidate shall pass a *viva voce* examination similar to that required by rules 38 and 39 for a second class engine driver's certificate but of a more advanced character.

44. Temporary permits. — (1) A person who has served at sea or on Inland Waters:—

(i) for a period of three years as Driver in charge of the engines of a Motor Vessel of not less than 60 brake horse power followed by a further period of two years in charge of the engines of a Motor Vessel of not less than 85 brake horse power; or

(ii) for a period of two years as Second Driver of a Motor Vessel having engines of not less than 180 brake horse power while holding a Certificate of Competency as Second Class Engine Driver of an Inland Motor Vessel, during which period he must have been in charge of a watch for eight hours per day; or

(iii) for a period of five years as Driver in charge of the engines of a Motor Vessel of not less than 70 brake horse power; may, on undergoing an examination to the satisfaction of the Examiner be granted a permit to take charge of the engines of an Inland Motor Vessel upto a maximum of 360 brake horse power in order to enable him to acquire the requisite qualifying service for a first Class Engine Driver's Certificate of Competency.

(2) A permit granted under sub-rule (1) shall be valid for a maximum period of eighteen months

from the date of issue and shall not be renewable beyond a period of eighteen months.

Qualifications for Certificate of Competency as Engineers of Inland Motor Vessels

45. Age. — A candidate for a certificate of competency as Engineer of an Inland Motor Vessel shall not be less than the age of 29 years.

46. Qualifications. — Such candidates must have minimum qualification of Eighth standard of English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(ii) Such candidates who desire to appear for examination of competency as Engineer of an Inland Motor Vessel should undergo Advance Refresher training course in the Maritime School Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(a) he must have served for not less than four years as an apprentice engineer or journeyman in the making, fitting and repairing of steam or motor-engines such as would be recognised as affording useful training for a marine engineer. No time served before the age of 15 will be accepted. Not less than three years of this period must have been spent at fitting, erecting or repairing internal combustion engines. The remaining year may have been spent either wholly or in part on work of this nature, or at an approved technical school as mentioned in the rules for examination of sea-going engineers.

Service as journeyman will be considered as equivalent to apprenticeship but net time served before the age of 15 is reached, will be accepted.

Workshop service other than the above may be accepted if it is considered useful training for a motor engineer, but all such cases must be submitted to the senior Examiner for consideration before the candidate is examined and at least an additional three months of qualifying service on marine internal combustion engines either in the works or on regular watch in the main engine-room of vessels propelled by these engines must have been performed in respect of each twelve months of workshop service of this nature, or other than on the making or repairing of internal combustion engines so accepted. If the service is not altogether satisfactory, a longer additional period than that specified may be required.

Any deficiency in the requisite four year's workshop service may be made up by service afloat on regular watch in the main engine-room of a vessel of not less than 565 brake horse power propelled by internal combustion engines.

If the vessel is a sea-going vessel one and half times the period of deficiency shall be served, and if an inland vessel two and a quarter times the period of deficiency shall be required. Thus a candidate who has no workshop service shall serve six years in a suitable sea-going vessel; or nine years in an inland vessel in lieu of his apprenticeship.

(b) In addition to the workshop service as described above or the alternative service afloat, the candidate must have spent eighteen months at sea as engineer on regular watch on the main engines of a sea-going ship propelled by internal combustion engines of not less than 565 brake horse power or 27 months in a similar inland vessel.

47. Additional qualifications. — Such candidate shall —

(a) be able to write a legible hand and have a good knowledge of arithmetic up to and including vulgar and decimal fractions and square root. He must also be able to work out questions relating to spring or level-loaded safety and relief valves, consumption of oil and stores, capacities of tanks, bunkers, etc., speed of vessel and other similar problems, and be able to calculate suitable working pressures for air receivers of given dimensions and the stress per square inch on crank and tunnel shafts and other parts of the machinery when the necessary data are furnished;

(b) be able to give a clear explanation of the principles on which oil, gas or other internal combustion engines work, including the methods of ignition, to point out the differences between them, and to show by means of illustrative sketches and otherwise that he understands the details of the construction of those in general use;

(c) be familiar with the various methods of supplying air and fuel to the cylinders in the different types of engines, the construction of the apparatus for carburetting, atomising, or gasifying the fuel, and the means for cooling the cylinders, pistons, etc.;

(d) have satisfactory knowledge of the process employed in the construction of internal combustion engines in the workshop, and of the methods used in fitting the machinery on board a ship;

(e) know what attention is required by the various parts of the machinery and understand the use and management of the different valves, cocks, pipes and connections;

(f) be able to state and describe the chief causes which may make the engines difficult to start and to explain how he would proceed to remedy any defects arising therefrom. He must also be able to show that he understands the mechanism of the starting and reversing arrangements, and is competent to deal with defects therein;

(g) understand how to make good the result of ordinary wear and tear to the machinery, how to test the fairness of shafting, etc. how to correct defects from accident, delay etc. and how a temporary or permanent repair could be affected in case of derangement or total break-down;

(h) understand the construction of the pressure gauge, barometer, thermometer and other instruments used in the engine-room and the principles on which they work.

(i) understand the construction and working of centrifugal, bucket and plunger pumps, and the principles on which they act;

(j) understand the construction and working of air compressors, gas producers, steering engines, electric light engines and dynamo, electric motor, refrigerating, hydraulic and other auxiliary machinery found on board a ship;

(k) possess a good working knowledge of the construction and management of auxiliary steam boilers and machinery and be familiar with the prominent facts relating to combustion, heat and steam;

(l) be familiar with the nature and properties of the various oils, etc. generally used in internal combustion engines, and understand what is meant by "flash point" and have knowledge of the explosive properties of gas or the vapour given off by those oils, etc. when mixed with definite quantities of air, and be thoroughly conversant with the danger of exposing such gas or vapour to a naked light; or of, allowing any leakage from the oil tanks particularly into the vessel's bilges, and unventilated spaces, or from gas producers, pipes, vapourizers etc.

(m) thoroughly understand the precautions to be taken against fire or explosion from oil or gas, and know how to deal with fire, should it break out. He should also be familiar with the action of wire gauge diaphragms when placed in pipes and connections to oil tanks, etc., for the purpose of preventing the explosion or ignition of oil vapour therein;

(n) be able to explain the principle, construction and arrangement of primary and secondary batteries and induction coils so far as is necessary for the efficient management of an oil engine;

(o) be able to take off and calculate indicator diagrams and understand the action of the gas in the cylinder as shown thereby; and

(p) have a fair knowledge of the rudiments of projection and be able to make a dimensioned working drawing of some simple part of the machinery with which he ought to be familiar or to complete and develop a given example. Drawing boards and T-squares will be provided but candidates shall have to bring with them any drawing instruments they require.

48. Motor-vessel certificate to Steam Vessel Engineers. — An engineer in possession of a (steam) certificate of competency as an engineer is also eligible for a certificate as an engineer of inland motor vessels under the following conditions: —

(a) he must have served for not less than six months as an assistant engineer on regular watch on the main engines of a sea-going ship propelled by internal combustion engines of not less than 565 brake horse-power or nine months in a similar inland vessel whilst holding a first class certificate of competency for sea-going steamships granted or recognised as valid under the Merchant Shipping Act, 1958. He shall also satisfy the Examiners that he is fully conversant with internal combustion engines and be able to show both in writing and in a *viva voce* examination that he has satisfactory knowledge of the subjects covered by sub-rules (c) to (h) and (m) to (p) of rule 47 of these rules; or

(b) He must have served for not less than twelve months as an assistant engineer on regular watch on the main engines of a sea-going ship propelled by internal combustion engines of not less than 565 brake power or eighteen months in a similar inland vessel whilst holding a second class certificate of competency for sea-going steamships, granted or recognised as valid under the Merchant Shipping Act, 1958. He shall also satisfy the Examiners that he is fully conversant with internal combustion engines and be able to show both in writing and in a *viva voce* examination that he has satisfactory knowledge of the subjects covered by sub-rules (c) to (h) and (m) to (p) of rule 47 of these rules.

49. Motor endorsement on steam vessel certificates. — Engineers in possession of steam certificates of competency as engineers granted under the Act may be examined for motor endorsement on their certificates:

Provided that they have served for not less than twelve months as assistant engineers on regular watch on the main engines of sea-going ship propelled by internal combustion engines of not less than 565 brake horsepower or eighteen months on a similar inland vessel whilst holding a certificate as engineer.

General rules as to Examination

50. Candidates not to take books, etc., into examination room. — All books necessary for the use of candidates under examination shall be provided by the Government and applicants shall not be permitted to take into the examination room any book, paper, documents, or memoranda of any description whatever; and, subject to the provision referred to hereafter, they will also not be allowed to work out their problems on a slate or on waste paper.

51. Supply of additional papers. — Candidates shall be allowed in the time allotted to cancel any part of their work, and when required, additional papers shall be supplied by the Examiners. These additional sheets must be attached to, and form part of, the examination papers.

52. Punishment for breaking rules. — In the event of any candidate being found copying from another, or affording any assistance or giving any information to another, or communicating in any way with another during the time of examination, he will be regarded as having failed in his examination, and will be debarred from re-examination for a period of three months, as if he had failed in the practical part of the examination, and no part of the fees paid for examination shall be refunded to him.

53. Leaving examination room. — If a candidate leaves the room before answering any question which has been given to him, he shall not afterwards be permitted to answer it, but the Examiners may substitute the question by other data or another question.

54. (a) Questions and answers. — The examination of candidates for certificates of competency as engineers consists of four parts: — Arithmetic, Drawing, Elementary Questions and *viva voce*. The minimum marks for passing in Arithmetic is 40%,

in Drawing 50%, in Elementary Questions 50% and in viva voce it is 60%.

(b) Specimen questions in Appendix C.— All candidates presenting themselves for examination for certificates of competency as engineers shall be required to give written answers to eight out of a list of ten questions given to them. Specimen questions for the guidance of candidates are continued in Appendix C.

55. **Answers in the Form.**— The Form on which these answers are to be written, shall contain also some questions as the experience of the applicant, to be answered by him in writing.

56. **Additions to Questions.**— Examiners may add to their viva voce examination questions on practical management of steam engines and boilers.

57. **Standard required to pass examination.**— If at the expiration of the time allowed, the candidate has worked out correctly the whole of the questions set to him, and give satisfactory answers in the viva voce examination, he will be declared to have passed.

If at the expiration of the time allowed he has not worked out the whole of the question set to him, but if the result of the viva voce examination, taken in connection with the answers to such of the questions as he has worked out, is sufficient to satisfy the Examiner that the applicant is competent to take charge of engines, he will be declared to have passed. In other cases he shall be declared to have failed.

58. **Report of examination.**— (1) A report of the examination, and the examination papers, shall be forwarded to the Captain of Ports, Panaji.

(2) An Examiner's Authority shall issue to the successful candidate an authority certificate and one copy thereof shall be forwarded to the Captain of Ports alongwith the report of examination.

59. **Issue of Certificate of Competency to Successful Candidates.**— On receipt of report from the Captain of Ports certifying that the candidate is eligible for grant of certificate of Competency of the grade applied for by the candidate, the Government shall issue a Certificate of Competency in the respective Form under "Appendix-E" appended to these rules to the successful candidate.

Failure.— If a candidate fails in the viva voce or practical part of the examination, he may not present himself for re-examination until he can produce proofs of three months further service afloat. If he fails in arithmetic or drawing only, he may come up again for examination at any time. Engine Drivers may be examined de novo after six months' service afloat.

Fees

60. **When fees are to be paid.**— Candidates for examination, in making their applications shall be required to pay the examination fees before any step is taken, whether by inquiring into their services or testing their qualifications etc. No part of the fee shall under any circumstances be returned to them; but should it be found that their service is not sufficient to entitle them to be examined, or that their testimonials are unsatisfactory, they will

be allowed to present themselves for examination without paying any further fees, when they have fulfilled the requisite service, or are able to produce satisfactory testimonials, as the case may be.

61. **Where fees are to be paid.**— The fee for examination shall be paid in the office of the Captain of Ports, Panaji, or Mormugao. If a candidate is found offering money to any person other than the Cashier, and in any place except in the Cash section, the candidate so offering money shall be regarded as having committed an act of misconduct, and shall be debarred from examination and shall not be allowed to be examined for twelve months from the date of such debarring.

62. **Refund of Fees.**— The fees for deck certificate include the fee of Rupees five for re-examination in sight tests, and if a candidate fails to pass these tests, this fee shall, with the exception of Rupees five be refunded to him. If a candidate fails to pass any other part of the examination, no part of the fee shall be refunded to him.

If a candidate for engine room certificate fails in his examinations, no part of the fees paid shall be refunded to him.

63. **Scale of fees.**— Examination for Grant of Certificate of Competency as Masters or Serangs, Engineers or Engine Drivers — Rs. 200/-.

General

64. **Candidates who undergo courses at Maritime School, Britona.**— Candidates who produce certificates of having completed the respective course at the Maritime School, at Britona, shall be given remission of service of half the time attended at the school in cases of first certificates of competency only.

65. **Forms of Certificates.**— Certificates of Competency described above shall be made and issued in the Forms hereunto annexed.

66. **Certificate to be in duplicate.**— Every certificate of competency shall be made in duplicate and one copy shall be delivered to the person entitled to the certificate, and other shall be kept and recorded by the Captain of Ports, Panaji.

67. **Certificates granted by other Governments.**— A certificate of competency or service granted by the Government of any other State in India shall be endorsed by the Government as having effect in this State after the holder thereof has passed a supplementary examination before the Examiner as to his local knowledge of the port for which he desires a certificate. Half the usual fee shall be charged for this examination.

APPENDIX 'A'

(See rule 9)

SIGHT TESTS

Details as to the conduct of the test

The object of these tests is to ensure that the candidate's eyesight is sufficiently good to enable him to pick up and identify correctly the lights of distant

ships at sea. Experience has shown that for this purpose he must be able to reach certain minimum standards both of form and colour vision.

The test employed are two, a letter test and a lantern test, details of which are given below. The letter test is a test of form vision only and the lantern test is a test of form and colour vision combined.

The test must be conducted under the strict personal supervision of the Examiner. A careful record must be kept of all mistakes made by the candidate both in the letter test and in the lantern test.

Each Examiner shall keep a record of all candidates passed by him for reference when required.

Spectacles not allowed. — During the examination in the sight test candidates shall not be allowed to use spectacles or glasses of any kind or any other artificial aid to vision. They will, however, have the option of using either eye separately or both eyes together.

I — LETTER TEST

1. *Letter test to be taken first.* — The first test which the candidate is required to undergo is the letter test.

2. *Apparatus used.* — The letter test to be used for all candidates is that conducted on Snellen's principle by means of sheets of letters.

3. *Standard of vision required.* — Every candidate shall be required to read five of the six letters in the sixth line and four of the seven letters in the seventh line, using either eye or both eyes at his option.

4. *Method of testing.* — The test sheet should be hung on the wall in a good light, but not in direct sunlight, at a height of five or six feet from the ground. The candidate should be placed at a distance of exactly 4.88 metres from the sheets, and exactly opposite them. This distance should be carefully measured, and should never in any circumstances be varied.

One of the sheets should then be exposed, and the candidate should be asked to read the letters on each sheet, beginning at the top and going downwards. Any mistakes which he makes should be carefully noted. If then it is found that he has read correctly at least five letters in the sixth line and four letters in the seventh line of a sheet, the candidate may be considered to have normal vision, and should be marked passed in the appropriate column of the Form of application.

5. *Passing or failure.* — If at the conclusion of the test the candidate is found to reach required standard, he may be considered to have passed and the Examiner should proceed with the lantern test, unless the candidate holds a certificate of competency. If the candidate fails to reach the standard rerequired for the certificate entered for, he should be tested with at least four sheets, and the Examiner should record on the Form No. 3 the number of mistakes made in each line of each sheet, and explain to the candidate the alternative mentioned in rule 9 (d).

Failure to pass letter test is due to some defect in form vision, and such defects are sometimes curable. However, therefore, a candidate fails to pass this test the Examiner should advise him to consult an ophthalmic surgeon with a view to ascertaining what is the nature of the defect in his form vision and whether it is curable.

6. *Test to be varied.* — The Examiner should take care, by varying the order of the test sheets and by every other means in his power, to guard against the possibility of any deception on the part of the candidate.

II — LANTERN TEST

7. *Apparatus.* — A special lantern and a mirror have been provided for this test. The lantern should be placed directly in front of the mirror, so that the front part of the lantern is exactly 3.048 metres from the mirror. Care should be taken that the lantern is properly placed that is to say, the lights reflected in the mirror must show clearly when viewed from the position of the candidate on the left of the lantern. The Examiner should always satisfy himself that these conditions are fulfilled before commencing the examination.

8. *Darkness adaption.* — If a candidate makes mistakes at the beginning of the lantern test he should be kept in a completely or partially darkened room for at least a quarter of an hour and should then begin the test again.

Before the examination commences, the Examiner shall satisfy himself that the room in which it is conducted is so darkened as to exclude all daylight.

9. *Method of testing.* — The lantern supplied for the examination is so constructed as to allow one large or two small lights to be visible, and is fitted with 12 glasses of three colours — red, white and green. At the commencement of the examination, the Examiner should show to the candidate a series of lights through the large aperture, and should require him to name the colours as they appear to him. Care should be taken in showing the white light to emphasise the fact that the light is not a pure white. If a candidate makes a mistake of calling this light red a proper red light should be shown immediately after and the candidate's attention directed to the difference between the two.

After series of lights through the large aperture has been shown the Examiner should make a complete circuit with the two small apertures, requiring the candidate to name the colours of each set of two lights from left to right. To prevent any possibility of the order in which the lights are arranged from being learnt, the Examiner should be at least twice in each circuit go back a varying number of colours.

A record of any mistakes made with either the large aperture or the two smaller apertures should be kept on prescribed Form in accordance with the instructions thereon.

10. *Passing or failure.* — If a candidate with either the large aperture or the two smaller apertures of the lantern mistakes red for green or green for red, he should be considered to have failed in the lantern test.

If the only mistake made by the candidate with the lantern is to call the white light "red" and if after his attention has been specially directed to the difference between the two he makes no further mistake of this nature, he should be considered to have passed in the lantern test.

If a candidate makes any other mistake with the lantern i. e. if he calls white "red" repeatedly or red "white" at all, or confuses green and white, his case should be reported to the Captain of Ports, Panjim, and he should be told that the decision as to whether he is passed or failed, or must undergo a further examination, will be communicated to him in due course. Pending the receipt of the Captain of Ports instructions such a candidate should only be allowed to proceed with the remainder of the examination for a certificate of competency on the express undertaking that the latter's examination will be cancelled in the event of failure in the Sight Tests.

11. Further examination and appeals.—If in the cases covered by the preceding paragraph, the Captain of Ports decides that a further examination is necessary, arrangements will be made for a special examination.

If, however, on the report of the Examiner the Captain of Ports decides that the nature of the mistakes made shows conclusively that a candidate's sight is so defective as to render him unfit to hold a certificate, the candidate shall be considered to have failed.

In cases, where, upon the report of the Examiner, a candidate is failed by the Captain of Ports, as well as in the case of a special examination, the Government may allow a candidate who is dissatisfied with this decision to appeal for a further examination, subject to the conditions set out in rule 8.

APPENDIX 'B'

... hereby certify that ... has served with me in the engine room of ... as ... for a period of ... during which time he has discharged his duties to my entire satisfaction.

I consider that he fully understands the working of an engine, and has sufficient tact, presence of mind, and energy to look after and manage the working of the engines of an inland vessel having engine of 30 nominal horse-power or upwards, but of less than 80 nominal horse-power.

Dated: ...

Signed: ...

No. and description of certificate

Any engineer giving a testimonial in this form should be very careful in doing so, as the document may materially influence the applicants eligibility as a candidate.

APPENDIX 'C'

Examination in rough working drawing for an Engineer's Certificate of Competency

1. The regulations in regard to the qualifications of a candidate for an engineer's certificate of competency are.—

He must be able to make rough working drawing of the different parts of the engines and boilers.

He must be able to state the general proportions borne by the principal parts of the machinery to each other.

2. In accordance with these clauses, a candidate for an engineer's certificate is required to make a rough working drawing of the parts specified. A mechanic, who has been some years in charge of marine engines and boilers ought by this time to have familiarity in his mind, the general construction of at least one set of engines and boilers, say that set he was last with. Fine drawing is not expected, and in the proportions of the parts a wide margin will be allowed; absurd dimensions will entail failure in practical knowledge.

3. The drawing must, however, be practically a working/drawing, giving, a sufficient number of views to show the parts fully-sections, plans, or elevations just as the candidate would require to be supplied to him if he had to make the parts to the design of another person.

4. A clear hand sketch showing the construction completely, and fully dimensioned, will be accepted if the candidate prefers this alternative.

5. A portion only of the parts specified may be accepted in place of the whole, if the portion is sufficient to show that the candidate has a good practical idea of the construction of the parts, and a fair notion of their general proportions or dimensions.

6. Candidates are hereby cautioned not to put on paper what they have not fully considered, and deliberately intend to be understood as their statement of what they know about the construction of any part required.

7. The statements given in by a candidate may be in themselves, apparently, of little importance, but, as sample material from which the state of the candidate's knowledge of engines and boilers is to be inferred, every detail which is glaringly inconsistent with a sound knowledge of the use of the part, or in which as essential consideration as evidently been overlooked is an important element in the description which the candidate is giving of his own qualifications.

8. The candidate is advised not to begin more than he can clearly finish in the time allowed. An important object in this part of the examination is to ascertain whether the candidate can be trusted to mark all necessary dimensions upon a sketch or a drawing. The test of this is, practically, the making of the part from the sketch without having to supply additional dimensions and without measuring the drawing. To provide this ability the candidate must fully dimension the parts shown in his sketch or drawing notwithstanding that the parts may be correctly drawn to scale. A drawing is fully dimensioned when no part of it is left to the option of the person or the person who is to work to the drawing.

9. To prevent misunderstanding; however, when the candidate has been led into showing more of the details than he has time fully to finish, he should

name, in the statement, on the other side, the particular parts which he has fully dimensioned.

10. All dimensions should have lines and arrow heads to indicate distinctly the points between which the dimensions are given.

11. The candidates should not write cross dimensions upon centre lines, or upon longitudinal dimension lines. This is not an order but a recommendation.

12. The candidate is not expected to design anything but to sketch or draw something with which he is expected to be already familiar.

13. Make sure that there will be sufficient room on the drawing sheet to show all the necessary views. There can be another sheet of drawing paper, if necessary. All the papers used must be forwarded with the drawing.

14. Fill in and sign the following statements:

(SPECIMEN)

Subject for examination in rough working drawing

(Read the foregoing general instructions)

A common slide valve with its spindle. Show also an outline section of the parts at the cylinder face. Show the provision for connecting the slide valve to the spindle.

The candidate is required to fill up the following and to attach this paper to his drawing:—

Statement by the candidate

The accompanying drawing, made by me this day, without reference to any document, and without the assistance of any person is intended by me to be sufficient for the new construction of the parts above described to fit the places of similar parts which are to be removed. The construction is similar to what I have been with in the ... steamer ... but the dimensions may be different.

The diameter of the cylinder is

The stroke of the piston is

The travel of the valve is

The cover at top end of steam side is

The cover at bottom end on steam side is

The load at top is intended to be

The load at bottom is intended to be

The inside cover is

The thickness of the face of valve is

The thickness of the body of valve is

The greatest opening for steam will be

That gives an area equal to one

The opening for exhaust when the crank is on the top centre is

That gives an area equal to ... of the piston

The valve will cut off steam on the top stroke at

The valve will cut off steam on the down stroke

The parts fully dimensioned in ink, are

The candidate may omit this part if he chooses

Dated at ... this ... day of ... 19 ...

Applicant

APPENDIX 'D'

Specimen Elementary Questions for the Examination of Engineers for Certificates of Competency

1. What parts of an engine are generally made of wrought-iron?
2. What parts of an engine are generally made of cast-iron?
3. For what parts of an engine is steel sometimes used?
4. What parts of an engine are generally made of brass or gunmetal?
5. Where is white metal sometimes used? On account of what property possessed by it is it adopted? What objection is there to its more general use?
6. For what parts is Muntz metal sometimes used? Is it malleable?
7. What difference is there in the composition of cast-iron, of wrought-iron and of steel?
8. How can cast-iron, wrought-iron, and steel be distinguished from each other?
9. What are the different properties of cast-iron, of wrought-iron and of steel?
10. What is meant by the terms breaking stress, proof stress, safe working stress?
11. What is the cohesive strength or breaking stress of good ordinary wrought iron?
12. Tampering steel how is it done, and in what order do the colours come?
13. What is case hardening?
14. Which of the common metals or alloys can be forged, and which of them are brittle or short?
15. What is meant by welding? Which of the common metals can be welded?
16. The expansion of metals by heat; give examples of this in the engine and in the boiler.
17. In the construction of cylindrical marine boilers for what parts have the plates to be worked hot? When the material is steel what precautionary treatment of these plates is afterwards necessary?
18. What is double riveting? In what parts of cylindrical marine boilers is double riveting employed? In which of the shell seams is it most necessary?

19. What is "caulking" and how are seams prepared for caulking?

20. Describe the different ways of fastening the ends of the main stays of a boiler. What are the merits, or objections to the different methods?

21. What strain per square inch is allowed on boiler stays?

22. Describe a reveted stay, and state where such stays are commonly used?

23. Where are thin plates to be looked for in a boiler as it wears and how is the thinness to be detected?

24. How are boiler tubes fixed? What are "stay tubes" and how are they secured?

25. Where is it generally that boiler-tubes leak? How is this defect repaired? What are causes of this leaking?

26. What are the causes of cracked tube plates? Where are the cracks situated? How are they repaired?

27. What is the difference between a dry 'uptake' and a "wet uptake"? Which required most repair? Why? Where have you seen a wet uptake?

28. What is a superheater? What is its construction? What valves are on it? There is sometimes a gauge glass on it; What is that for?

29. What parts of a marine tubular boiler are first injured by shortness of water?

30. Where are angle irons sometimes used in the construction of a boiler, and where are flanged plates used?

31. Priming: to what causes as it attributed? What means are applied to prevent it? What evils may be produced by it?

32. Funnel draught: What makes it? What checks it?

33. Flame is sometimes seen at the top of a funnel: What causes this appearance: Is it beneficial or it is detrimental? Why so?

34. A blast pipe: What is its construction? Where is it placed? for what is it used?

35. How many bottom blow off cocks are generally fitted to each boiler and why are they so fitted?

36. Blow-off cocks are sometimes fitted with a spanner guard for what purpose is this? Describe how the guard is formed.

37. Test cocks or watergauge: cocks: Where are they placed? At what heights? Must the cocks themselves be at these heights? What provision is made for clearing these cocks? Should they ever become chocked. When there are no test cocks, how is the height of the water ascertained?

38. What is a dead-weight safety valve? Of what are the rubbing surfaces formed? How is a lock up valve arranged to admit of lifting it or of turning it round, and to prevent adding to the weight?

39. About what area of safety valve is now required by the Board of Trade? What area was formerly required and on what ground has that been altered? What is the effect of suddenly opening a safety valve when steam is up? To about what extent to safety valves rise when blowing off without being eased by hand?

40. Spring-loaded safety valves: What advantages have they that are not possessed by dead-weight valves? What are the disadvantages as compared with dead-weight valves?

41. Of what pieces does a glass water-gauge mounting consist? How does it act? Where is it placed? At what height? Is it liable to derangement? How is its working tested?

42. Glass water-gauges have sometimes pipe connections top and bottom? What is the object of the arrangement? Should there be cocks at the extremities of these pipes?

43. Describe a Bourdons steam-gauge. Some gauge have an inverted siphonopipe below them: What is its use?

44. Why is a small cock sometimes put on the pipe leading to a steam-gauge? Where should it be placed, and what error might be made by omitting to use it?

45. Do steam-gauge indicate the total pressure of the steam, or only a portion of that pressure? What is the pressure measured from?

46. What is meant by the salting of the boiler? How is this prevented? What is the density of ordinary sea water? How is the density ascertained? What is the difference between the formation of scale and the salting of the boiler? What is the maximum density at which boilers should be worked at sea?

47. Scum cocks and pipes? How are they arranged? Where are they placed? At what height in the boiler? When are they used? When must they be shut? Neglect of these cocks lead to what dangers?

48. Scale: of what does it consist? Where is it most objectionable? How is it removed? How is its formation prevented? What evil effects are produced by it?

49. What is a salinometer? Of what does it consist? How does it act? How is it graduated? Can it be used at any temperature indiscriminately?

50. What harm may be done through the check valve of one of a set of boilers being defective while under way? How would you work to avoid this harm?

51. How is the leak from a split tube stopped in a boiler at sea?

52. What is the use of dampers? Where are they fitted? When they should be used?

53. When there are no dampers fitted, what is used instead? What evil to the boiler is

sometimes attributed to this? When the heating surface is clean, does this occur?

54. Describe the piston of a steam cylinder with its different rings and their uses. There are generally round pieces let in flush on one side of a piston: What are they? How are these pieces fixed?

55. Cylinder drain cocks: What is their use? There is sometimes a valve upon each cock: What purpose does it serve?

56. Cylinder escape valves: of what does they consist? How protected? How regulated? When are they most needed? To what danger do they expose these engines? What precaution is sometimes used to obviate this danger?

57. What is compound engine? What different kinds are there for screw steamers in respect to the number and arrangement of their cranks and cylinders? What is a triple expansion engine?

58. What is link motion? What are some of its advantages? In modern engines for the screw propeller, when there is no link motion, what takes its place?

59. What is a separate expansion valve? Why is it not fitted to all engines? What effect has an expansion valve upon the starting and upon the reverting of the engines?

60. What arrangement is applied to reduce the friction of a slide valve? To what is the friction due?

61. Describe a loose eccentric. How does it set? In what engines is the loose eccentric still employed?

62. What is the travel of the eccentric rod? How is it measured on the eccentric? What is the travel of the slide valve when the link motion is in mid gear and the engine still moving?

63. What are "double-boat" "Valves"? Why are they not generally used for safety valves? Are they ever used instead of the valve? What objections are there to their use?

64. What is a circulating pump? Is it always worked by the main engine? Give an example from your last steamer of the three water temperatures generally noted by careful engineers.

65. An air valve is sometimes fitted to a circulating reciprocating pump: what purpose does it serve?

66. What is the difference between a bucket air pump, a piston air pump, and a plunger air-pump?

67. whether double acting air pumps are made with plungers, with pistons or with buckets?

68. What is an airpump trunk? When is it necessary? How is it attached to the bucket?

69. What class of air pump requires both feet and delivery valves and in what other class can either of these valves be in some cases dispensed with?

70. When under way, when the air-pump bucket is at the top of its stroke, at what height is the water in the condenser?

71. With a surface condenser and a single acting air-pump, what is the effect of a leaky foot valve and what is the effect of a leaky bucket when there is also a foot valve?

72. Air pump pet cock or valve where is it placed? How does it act? What is its object? Does it in every case reduce the effective capacity of the pump? Is it equally applicable to double acting pumps?

73. At what temperature is the best well worked? What is the effect of higher temperatures? What is the effect of lower temperature? What limits the lowness of temperature? Has very low temperature any disadvantages?

74. Bilge injection with common condensers: What are the fittings required? When is it used? What precautions are necessary in using it?

75. When surface condensers are used, what takes place of the bilge injection? To what is the connection made? How is its valve formed? Why is this necessary?

76. What are the practical guides to the proper amount of opening of the inlet valve for the circulating pump?

77. Food-pump pet cock or valve: where is it placed? What is its use? How does it act? Is it always a necessary fitting?

78. What are some of the ways of fastening the ends of surface condenser tubes? About what size and about what thickness are condenser tubes? What parts of a surface condenser are made brass?

79. What is a blow-through valve or cock? To what is it attached? There is sometimes a valve that when opened admits steam from slide valve causing to the exhaust part: What is its use? To which cylinder is it fitted?

80. What is a shifting valve? What is its use? Where is it placed? Can it be placed too high? Can it be placed too low? At what height should it be placed? Was there one in your last steamer, if so, where was it? Why are shifting valves generally omitted now?

81. What connections are generally fitted to the donkey-pump? And to what services can it be applied?

82. When the engines are stopped with steam up, what are to be shut and what are to be opened?

83. How is an engine heated up before starting? What precautionary examinations are made before starting?

84. What is an interceptor or catch-water? Where is it fixed? What is its construction? How does it act and what attention does it require?

85. Describe an air pump bucket, with its valve or valves and its packing of what are the valves generally made?

86. Of what materials are air-pumps rods made? Why so?

87. What is the racing of the engine? When does it occur? What danger attaches to it? What is done to prevent it?

88. What are marine Governors? What is their general constructions? How does they act?

89. What is meant by the pitch of a screw propeller? How is it measured?

90. Explain the difference between a right hand and left hand propeller and state how each of them revolves?

91. What is the slip of a screw propeller? How is its amount expressed in figures?

92. Which of the valves about engines and boilers have to be worked by hand, which of them work self-actingly, and which are worked by the motion of the engines?

93. Why is soda sometimes put into a boiler, and how is it put in while under weight? What is the kind of soda used?

94. Tallow cups for cylinders were sometimes made with two small cocks or with only one small cock or with one large hollow plug cock, or with one small cock and a valve which of those is suitable for a high pressure cylinder and which for the cylinder of a condensing engine? Describe how the cup with only one small cock is used. What is now generally used instead of these? How has this change came about.

95. Does a cylinder escape valve, self-acting, allow all the water to escape, if not how much is left in the cylinder?

96. What is a steam lubricator (sometimes called an impereator) Explain its action; to what part of the engine is it connected; whether will throwing cold water over it make it work faster or slower? Describe the one used in your last steamer?

97. A common paddle wheel; of what is the centre made? Of what are the arm formed? What is the form of the bolts which attach the floats to the arms? How are the arms attached to the centres?

98. Why have some paddle wheels one or more cast-iron-flats in each wheel? With what engines are these most required? At what part of the circumference are they placed?

99. Why are paddle wheel floats sometimes made of different breadth in the same wheel? With what description engine is this most needed? Where are the board floats placed and where are the narrow floats placed in the circumference of the wheel?

100. What difference is there between a radiapaddle wheel and one with feathering floats? What is the object of feathering floats? Are all the eccentric rods attached in the same way, and are they all of the same form?

101. Whereabout is the centre of the eccentric of a paddle wheel with feathering floats placed? In that case are the feathering lavers on the striking face or on the back of the float?

102. When the paddle shaft has an outer bearing, how is the eccentric made?

103. Of what materials are the working surfaces of a paddle wheel with feathering floats? Are they all lubricated? With what?

104. What is a disconnecting paddle engine? At what place is the disconnecting affected? How is it accomplished? In which of the cranks of a disconnecting engine are the crank pins fixed?

105. Whether is the link motion valve gear or the loose eccentric generally used for disconnecting paddle engine? For what steamers are disconnection paddle engines frequently employed?

106. What omission in the construction of expansion joints may lead to a serious accident when steam is first applied? How is this prevented in the construction of a steam trunnion pipe for an oscillating engine?

107. Describe an oil cup with a syphon worsted. How is the worsted arranged? How is it cleaned? How far down the tube does it extend?

108. Describe a thrust bearing: which of the surface wears? Why are there sometimes a number of oil tubes for one thrust bearing?

109. What parts of a screw shaft are generally covered with brass? Why is this necessary? About what thickness is the brass?

110. What is the stern tube or screw shaft pipe? Why is a pipe of such a length required? Of what is it made? How is it fixed at each end?

111. What is a lignum vitas bearing? How is the wood fitted? Where is such a bearing generally used?

112. How is a screw propeller fixed on the shaft? What means are used to prevent its getting loose at sea?

113. Where are sluice valve placed? What large sluice valve is there in almost all screw steamers? From what position should this valve be worked? Why so? What attention should it receive?

114. With a condensing engine what valves or cocks are on the skin of the ship in the engine-room and in the stokehole?

115. What are the necessary fittings of a marine boiler?

116. With a surface condensing engine what cocks or valves are open some time before the engine is started so as to be ready for starting whenever the order is given?

117. What is a steam jacket? What cocks are on it? In what engine or jackets most generally used? Do they require to be felted?

118. What parts of an engine or its fittings should be felted or otherwise protected from radiation?

119. What are the small cylinders sometimes fitted on the slide valve casing cover of vertical engines? Explain their action. To what are they connected by a pipe? Why so?

120. Name the principal pipes in connection with the engine boilers of a steamer? and state to what the ends of these pipes are connected?

121. Through what cocks or valves, pipes and chambers does the water pass on its way from the sea inlet rose plate to the water space of the boiler with a jet condenser?

122. Through what cocks or valves, pipes and chambers does the circulating water of a surface condenser pass?

123. Through what cocks or valves, pipes and chambers does the steam pass from the boiler until it is in the form of water in the hot well?

124. Name the pieces of the engine through which the pressure of the steam is transmitted from the piston to the screw propeller. Name them in the order in which they act?

125. What is an air vessel? How does it act? At what parts of an engine or of its fittings are air vessels generally applied?

126. What is the construction of a mud box? Where should mud boxes be placed? Why are they necessary? How should the space be divided by the rose plate and why?

127. What is a trunk engine? When used in a horizontal engine for a right-hand screw propeller, at which side of the vessel should cylinders be placed? Why so?

128. What is an oscillating engine? for what steamers are oscillating engines generally adopted? How is the steam conveyed to and from the slide valve casing?

129. Of what parts does the valve motion gear of an oscillating engine consists?

130. For what have geared engines sometimes been used? Of what were the cogs of the large wheel made?

131. At what part of a screw steamer is the pressure that propels it applied to the hull?

132. At what part of a paddle steamer is the pressure that propels it applied to the hull?

133. About how much fuel per indicated horse-power per hour is required by modern engines, common, compound and triple expansion?

134. What is the explanation of the economy of the surface condense?

135. What is the construction of a surface condenser? Of what are its tubes made? How are they fixed? How are they kept tight? What is done asplit tube?

136. Where do surface condensers foul? How are they cleaned?

137. What non-conducting substances are employed to prevent radiation and how are they applied?

138. In the construction of smoke box and of dry uptakes, what provision is made to lessen the amount of radiation?

139. How can the formation of block smoke be prevented? Describe smoke-preventing apparatus.

140. What is meant by "circulation" in a boiler? And what are the results of defective circulation?

141. What means are sometimes adopted to improve in the circulation in a boiler?

142. By what arrangements is the circulation promoted in a "haystac" boiler?

143. Describe a ship's side air-pump discharge valve; in what respect does it sometimes differ from a common step valve; and what attention does it require?

144. What is the construction of a feed-escape valve, to what is its discharge connected and how is its loading regulated?

145. When there is no feed-escape valve what is the arrangement of the feed valve cocks?

146. What is the measure of a horse-power? How is indicated horsepower ascertained?

147. Has nominal "horse-powers" a fixed meaning? What is the use of this expression? What is generally taken as the measure of one horsepower nominal?

148. What is "Back Pressure" in a cylinder? about how much is it in each of the cylinders in your last steamer? It excessive cushioning ever a trouble in certain conditions in modern engines? Say when and why and in which cylinder this occurs?

149. What is meant by "speed of piston"? About how much is the speed of piston in modern marine engines?

150. What is "atmospheric pressure"? What is its average amount? What instrument tell this amount?

151. What is "gross pressure" or "absolute pressure"? What pressure is it that is shown by the steam-gauge?

152. What is meant by "cutting of steam"? How is it done? What part of the valve regulate the cut off?

153. What is a piston slide valve? Describe its construction. Why are such frequently employed in place of the common slide valves. What is a great drawback to the use of these valves?

154. What fixes the time of closing the exhaust? After the exhaust is closed and before the port opens for steam, what becomes of the steam that is in the cylinder?

155. What is the "load" of the valve? What is its object? About what amount is it?

156. What is the 'cover' or 'lap' of the valve? What is its object? About what amount is it?

157. What is the "exhaust cover" of a slide valve? What is its effect upon cushioning and upon exhaust?

158. What is "minus cover" or "minus lap" on the exhaust? What is its effect upon the exhaust and upon cushioning?

159. What is "ushicking" or "compression" in a steam cylinder? How is it affected by the amount of cover or of minus cover there may be upon the exhaust? How is it affected by the exhaust pressure?

160. What is mean effective pressure? How is its amount ascertained?

161. What is a dial vacuum gauge? What is its construction? For what is it used? About what amount should it show when the engine is working all right? What effect has the variation it indicates on the performance of the engine?

162. Does the vacuum gauge enable to tell what pressure that is in the condenser or must you have recourse also to the barometer to arrive at that? How would you ascertain the actual amount back pressure there is in the condenser?

163. What is a barometer? What is its construction? Is a barometer sometimes used instead of a vacuum gauge? In what respect does the weather barometer differ from the vacuum gauge barometer?

164. The common vacuum gauge and the common steam gauge, in which of them are the graduations marked from atmospheric pressure? Does either of them tell what is the true actual pressure in the boiler or in the condenser?

165. Do steam and vacuum gauges vary with the variations of the weather barometer? When the weather barometer varies from 28 to 31, how much will the vacuum gauge vary and how will that affect the working of the engine? Why so?

166. Vacuum is generally stated as so many inches. What is meant by say 20 inches vacuum? What does that tell us about the absolute pressure than in the condenser?

167. From what depth will pump draw water? Is there any limit? Why?

168. What is vacuum? Can vacuum move a piston? When the temperature of the water in the condenser is 212°, what is the greatest degree of vacuum there can then be in the condenser?

169. What is a thermometer? Its construction? What is the property of matter, that is, the principle of its construction? What temperatures are regularly noted by careful engineers?

170. What is the temperature of (1) melting ice, (2) of boiling water, (3) of steam about 60 lbs. pressure by the steam gauge, (4) of steam about 100 lbs. and (5) of steam about 150 lbs. also (6) of smoke in the funnel, and (7) of water in the hot well?

171. What is meant by the conduction of heat? Give examples of it in the boiler and in the engine.

172. What is meant by the "convection" of heat? Give examples of it in the boiler and in the engine.

173. What is meant "radiation" of heat? Give examples of it in the boiler and in the engine.

174. Which is convection, which is radiation, and which is conduction in the following cases; (1) Heat from the glowing fuel to the furnace crown; (2) Heat passing from one side of furnace crown plate to the other (2) Heat passing from the steam pipe in the engine rooms (4) The heat of evaporation?

175. What are the effecting heating surfaces of a marine boiler? What is an objection to vertical heating surfaces?

176. What parts of a marine engine are exposed to danger when the temperature is below freezing point?

177. What precautions are necessary in cold climates when the temperature is below freezing point?

178. State as many ways as you can by which a boiler might not get its full food; that is, a boiler or one of the set of boilers gets short or water although the feed valve is open its proper amount; to what causes might this be due?

179. Of what are furnace bars generally made? About what thickness are they at top? About what space is between them? Whether are the bars put further apart for New Castle coal or for Welsh coal?

180. Which burns faster, New Castle coal or Welsh coal? Which is the flaming coal? Which makes smokes?

181. About how many tons of steam coal will be burnt per day in four furnaces, each 3' 0" wide and of about the usual length? On what grounds do you say so?

182. About how many tons of steam coal will be burnt per day with good compound engines to drive an ordinary steamer of 45 ft. beam 10 knots an hour by steam alone? On what grounds do you say so? What percentage more coal would be required to propel the same steamer 1 knot faster?

183. About how many tons of steam coal will be burnt per day with a good compound engine, surface condensers, the low pressure cylinder 70 inches diameter, doing average work? On what grounds do you say so?

184. A pair of inverted cylinder direct acting engine there is a liner half an inch thick between the ahead eccentric rod and the eccentric strap, in over hauling the engine this piece is lost and forgotten; what difference will its omission make in the working of the engine on the admission, on the cut off and of the exhaust of the steam? Which will take place earlier and which latter, distinguishing between the up stroke and the down stroke?

185. A pair of inverted cylinders direct acting engines driving a right hand screw; on which of the crosshead guide bars is the pressure greatest in the up stroke, and on which in the down stroke.

186. A screw propeller is getting loose, it has a little plate on the shaft, side ways on the key

or feather; how will this show in the engine-room?

187. How would you prove whether the centre line of the trunnion of an oscillating cylinder be fair with the centre line of the main shaft?

188. How can the fairness of a line of screw shafting be tested without lifting the shafts?

189. Where are steel gorgings generally used in marine engines?

190. What is the composition of nickel steel? Where is it sometimes used in engines and boilers?

191. How is forced draught generated on board ship and supplied to boiler furnaces? Is the air heated before delivery? If so, how?

192. What is the "induced" draught? Compare the merits of "forced" and of "induced" draughts.

193. How is the intensity of the draught measured? What is the usual pressure employed in the merchantile marine?

194. An explosive gas is liberated from bunker coal. Usually in well ventilated bunkers this gas escapes into the atmosphere without doing harm. In ill-ventilated bunkers the gas, after mixing with a certain proportion of common air, has been known to explode when a naked light has been brought in contact with. What is the composition of the gas? Where is it found? In bunkers, between docks, pockets and coal sheets? How may it be get rid of as soon as it evolves from the coal? How many cubic feet of air to one of the gas forms a violent explosive mixture?

195. A lighted lamp or candle has sometimes been lowered into an apparently empty paraffin tank and produced an explosion resulting in injury to the person holding the light. What did the tank probably contain, and what produced the explosion?

196. In vessels carrying coal cargoes it has been observed that, generally speaking, the gas which escapes from the body of the coal is found more abundantly at the forward end of the hold than at the after end. Why should this be so?

197. In recently opened ballast tanks, double-bottoms, and boilers, a light lowered into either has sometimes been extinguished. What would, in all probability cause this?

198. In double-bottom steamers where does the bilge water lie, and where are the roses of the bilge pipes fitted?

199. What is the advantage of a large rose over a small one?

200. Why specially in vessels carrying cargoes liable to shift, should engine room bilge suction be fitted to both wings of the bilge?

201. In a heavily listed vessel, why is it difficult to keep steam?

202. If the engine bilge pumps get chocked and water accumulated in the stokehold bilges, what effect does the water have upon the bilge boards and stokehold plates, when the ship is rolling violently?

203. In a triple-expansion engine, what spare gear do you consider necessary in the case of a foreign-going ship? Also what stores would you provide for a voyage to New Zealand?

204. What means are sometimes provided for temporarily coupling together the broken parts of, say, a turner-haft? Describe the fitting.

205. Does the pressure on the trust-collars vary with the horse-power or with the speed of the ship, or how?

206. If the holding down belts of a thrust bearing should become slack, what effect would it have upon the working of the engines?

207. In an engine with three cranks, which of the three is subject to the greatest torsional stores, (1) in going ahead, (2) in going astern?

208. Is it usual to make the crank shafts of a triple or quadruple expansion engine in one piece? Is the diameter of the shaft uniform and to end? Give your reasons for the practice which prevail?

209. In a "built" crank shaft how are the webs rigidly secured to the pins and to the body of shaft?

210. There are various descriptions of donkey engines in use on board ship for pumping purposes. Some pumps are fitted with escape-valves, some are not, why should this be?

211. Explain the function of an air-vessel fitted to a feed pump. Make rough hand sketch of (1) a satisfactory vessel? (2) an unsatisfactory vessel, where, say the air-spring has been destroyed by carelessness, or has never been properly provided.

212. Should cocks or escape-valves be fitted to air vessels, why or why not?

213. Where, by preference, should the escape-valves of a feed pump be placed? Why?

214. Scum cocks are sometimes fitted to boiler-shells at a height convenient for engineers to manipulate when standing in the stokehold; the scum pipes in such cases are led upward, inside the boiler, to a little above the combustion chamber tops, what danger may arise from this arrangement?

215. Cocks for testing the water level of boilers are sometimes fitted within reach of the engineer who is standing in the stokehold. These may have internal pipes leading upward and terminating at various levels. Under what circumstances may these become misleading?

216. Why should the pipe which leads from the bottom of the water gauge column to the bottom of the boiler front, or back, be covered with non-conducting materials? Why also should it never have lengthy horizontal bends?

217. In your own experience, how frequently is this pipe removed and cleared?

218. Why, even with the best of water-gauges, is it advisable to occasionally use the drain cock?

219. Steam hope have sometimes been inadvertently made in this length of piping leading from the top of the water-gauge column to the top of the boiler. Roughly sketch such loop and explain the danger arising from its existence.

220. Describe your method of thoroughly testing the water-gauge system to satisfy yourself that all the cocks and pipes are clear. Your answer can be written on a supplementary sheet of foolscap which the examiner will hand you. Hand sketches, more lines indicating pipes and circles indicating cocks, should be made. Identify the cocks and pipes by letters or numerals.

221. Describe the construction of a water-tube boiler mentioning the type selected?

222. In a water tube boiler, how is an economiser fitted, and what is its duty.

223. How is the water gauge fitted? Are glass-gauges used?

224. The pressure of the steam in water tube boilers is sometimes greater than at the engines. Why is this, and what percentage above the engine pressure does it amount to? How is the difference of pressure maintained?

225. Describe any automatic method of feeding water-tube boilers. Of what material are the tubes made?

226. Describe the construction of any steam turbine you are acquainted with, which is used on board ship. How is the expansion of steam effected? How many propeller shafts are employed, and how many propellers?

227. Is the same power available to go astern as to go ahead?

228. Of what material are the propellers made?

229. How many pounds of coal per indicated horse-power per hour are burnt with this type of engine? Name the type of boiler in use?

230. Describe the construction of a feed water-heater and give the name of its manufacturer.

231. Describe any well-known ash-ejector.

232. Describe any well-known independent feed pumps?

233. Are independent feed pumps automatic in their action? Explain the action.

234. What advantage, if any, have independent feed pumps, over feed pumps worked by the main engines.

235. To about what temperature is the feed water raised by passing through a feed heater?

236. What fittings are usually placed on a feed-heater? Why are they necessary.

237. Describe the construction of a feed filter enumerating its valves and cocks.

238. How can the filter be cleaned? And what ingredients are generally removed when cleaning takes place?

239. What is the intercepting material made of? How is it fitted?

240. Describe an evaporator; and mention the types.

241. What fittings are necessary with evaporator?

242. How is the brine got rid of?

243. How may the coils be cleaned?

244. What is a dynamo? Describe its various parts. For what is it used?

245. In what respect does an electric motor differ from a dynamo? Where are electric motors sometimes used on board ship?

246. Describe a system of electric lighting employed on board ship.

247. How is the position of a fault in the circuit discovered?

248. What is "sparking" and may it under some circumstances (naming them) be a danger?

249. What is "short-circuiting" And to what evil may it give rise?

250. What means are employed to prevent any part of the circuit becoming overheated?

251. Describe the features of an arc lamp.

252. Describe the construction of glow-lamp?

253. What is the usual candle-power of the small glow-lamps in general use on board ship?

254. Define the following terms: Ampers, volt, ohm, watt, what is the measure of an electrical horse power?

255. Explain the uses of switches, brushes, commutators, cutouts, field magnets, armatures and resistance-coils?

256. Why is it desirable to fit a dynamo in a cool place on board ship?

257. What undesirable effect will ultimately occur to an electric wire, whose section area is constantly diminishing, say through corrosion?

258. What danger might arise from loading electric wire through coal bunkers.

259. Is it better to load electric wires above or below sidecutters, why?

260. What instruments are used on board ship to ascertain the strength of an electric current.

261. Many ocean-going steamers are fitted with hydraulic cranes, etc. From where do they obtain their power? How is the hydraulic pressure kept at a relatively constant amount?

262. Is any difficulty experienced in working hydraulic cranes in frosty weather? If so, why?

263. Describe any steam steering gear you are acquainted with?

264. When the helm is put hard over and the ship is going full speed ahead what prevents the rudder returning to the amidship position?

265. In the case of steamship under way, does the officer, or man manipulating the steam steering wheel overcome any resistance exerted by the rudder?

266. Explain clearly what is being done by a helmsman manipulating the wheel of a steam steering engine.

267. Is there any difference between the amount of horse-power required to put a helm hard over in a given time when the vessel is going full speed ahead, and when she is going full speed astern? This question refers to a case of a steamer fitted with one rudder on and demands as more complete answer than merely "yes" or "no".

268. What precautions should be taken before removing a man-hole door from a steam boiler and why are these precautions necessary. In the absence of such precautions what casualties might occur?

269. Describe the chief features of the engine-governor fitted to a steamer you have served in. Describe its action. Give the maker's name and name of ship.

Note: The following six questions refer to oil motors, fitted to launches which carry passengers:

270. Name the principal parts of an oil motor, and briefly state their functions. Give the name of the makers of the motor.

271. What kind of oil is usually employed in oil motors? What is its flashpoint? What is its specific gravity? What is its calorific value? What precautions are taken in its storage to guard the public against casualty by fire or explosion?

272. How many cylinders are generally used in oil motors? What kind of piston is fitted? How frequently (measured in revolutions) is explosion per cylinder effected? How is explosion in the cylinder carried out?

273. Describe how an oil motor is started. If starting prove difficult where would you chiefly look for defects? How is piston speed modified? How is the speed of a vessel verified? How is reversing effected?

274. Before examining an oil motor with a naked light, what steps should be taken for safety's sake?

275. How frequently should an oil motor, working 12 hours a day, be opened up for examination, cleaned and its parts re-adjusted? What difficulty arises when the internal parts become fouled with carbonized oil?

Note: Questions isolated from their context should be read in the light of the context. Thus the "sparking" referred to in question 248 relates to the

sparking in an electric lighting circuit on board ship. See question 246.

APPENDIX 'E'

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as first Class Master of an Inland Vessel under Central Act I of 1917

To:

Whereas it has been reported to the Government that you have been found after examination, duly qualified to fulfil the duties of First Class Master of an Inland Vessel. I do hereby in pursuance of Central Act I of 1917 grant you this Certificate of Competency as such First Class Master.

By order and in the name of the Governor of Goa.
This ... day of ... 19 ...

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji-Goa.

(On the reverse)

(Page - 2)

No. of Certificate: ... Date of passing Examination ...
Bearer: ...

Date * and place of Birth showing Village, Taluka and Districts: ... Residence, showing Village, Taluka and District: ... Height: ...

Personal description, stating particularly any permanent marks or scars ... Signature or L. H. T. I.

Any master who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B. — Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

Issued at Panaji on the ... day of ... 19 ...

Captain of Ports, Panaji

* If not known exactly shall be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as Second Class Master of an Inland Vessel under Central Act 1 of 1917

To:

Whereas it has been reported to the Government that you have been found after examination, duly qualified to fulfil the duties of Second Class Master of an Inland Vessel. I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as Second Class Master.

By order and in the name of the Governor of Goa.
This ... day of ... 19 ...

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji - Goa.

(On the reverse)

(Page - 2)

No. of Certificate: ... Date of passing Examination ...
Bearer: ...

Date * and place of Birth showing Village, Taluka and Districts: ... Residence, showing Village, Taluka and District: ... Height: ...

Personal description, stating particularly any permanent marks or scars ... Signature or L. H. T. I.

Any master who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B. — Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji - Goa.

Issued at Panaji on the ... day of ... 19...

Captain of Ports, Panaji

* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as Serang of an Inland Vessel under Central Act 1 of 1917

To: ...

Whereas it has been reported to the Government that you have been found after examination, duly

qualified to fulfil the duties of Serang of an Inland Vessel, I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as Serang.

By order and in the name of the Governor of Goa.
This ... day of ... 19 ...

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji - Goa.

(On the reverse)

(Page - 2)

No. of certificate: ... Date of passing Examination ... Bearer: ...

Date * and place of Birth showing Village, Taluka and Districts: ... Residence, showing Village, Taluka and District: ... Height: ...

Personal description, stating particularly any permanent marks or scars ... Signature or L. H. T. I.

Any Serang who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B. — Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji - Goa.

Issued at Panaji on the ... day of ... 19...

Captain of Ports, Panaji

* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as Engineer of an Inland Steam Vessel under Central Act 1 of 1917

To: ...

Whereas it has been reported to the Government that you have been found duly qualified to fulfil the duties of Engineer of an Inland Vessel, I do hereby in pursuance of Central Act 1 of 1917, grant you this Certificate of Competency.

By order and in the name of the Governor of Goa.
This ... day of ... 19 ...

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji - Goa.

(Reverse)

(Page - 2)

No. of certificate: ... Date of passing Examination ... Bearer: ...

Date * and place of Birth showing Village, Taluka and Districts: ... Residence, showing Village, Taluka and District: ... Height: ...

Personal description, stating particularly any permanent marks or scars ... Signature or L.H.T.I.

Any Engineer who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N.B. — Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji - Goa.

This ... day of ... 19...

Captain of Ports, Panaji

* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as First Class Engine Driver of an Inland Motor Vessel under Central Act I of 1917

To: ...

Whereas it has been reported to the Government that you have been found duly qualified to fulfil the duties of First Class Engine Driver on an Inland Motor Vessel having engines of under 565 Brake Horse Power. I do hereby in pursuance of Central Act I of 1917, grant you this Certificate of Competency as Engine Driver.

This ... day of ... 19...

By order and in the name of the Governor of Goa.

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji - Goa.

(Reverse)

(Page - 2)

No. of certificate: ... Date of passing Examination ... Bearer: ...

Date * and place of Birth showing Village, Taluka and Districts: ... Residence, showing Village, Taluka and District: ... Height: ...

Personal description, stating particularly any permanent marks or scars ... Signature or L.H.T.I.

Any Engine Driver who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N.B. — Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji - Goa.

This ... day of ... 19...

Captain of Ports, Panaji

* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as Second Class Engine Driver of an Inland Steam Vessel under Central Act I of 1917

To: ...

Whereas it has been reported to the Government that you have been found duly qualified to fulfil the duties of Second Class Engine Driver of an Inland Steam Vessel having Engines of under 40 nominal horse power, I do hereby, in pursuance of Central Act I of 1917, grant you this Certificate of Competency as Engine Driver.

By order and in the name of the Governor of Goa.
This ... day of ... 19...

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji - Goa.

(Reverse)

(Page - 2)

No. of certificate: ... Date of passing Examination ... Bearer: ...

Date * and place of Birth showing Village, Taluka and Districts: ... Residence, showing Village, Taluka and District: ... Height: ...

Personal description, stating particularly any permanent marks or scars ... Signature or L.H.T.I.

Any Engine Driver who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N.B. — Any person other than the owner thereof, becoming possessed of this Certificate is required

to transmit it forthwith to the Captain of Ports, Panaji - Goa.

This ... day of ... 19...

Captain of Ports, Panaji

* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as First Class Engine Driver of an Inland Motor Vessel under Central Act I of 1917

To: ...

Whereas it has been reported to the Government that you have been found duly qualified to fulfil the duties of First Class Engine Driver of an Inland Motor Vessel having Engines of under 100 nominal horse power, I do hereby, in pursuance of Central Act I of 1917, grant you this Certificate of Competency as Engine Driver.

By order and in the name of the Governor of Goa.
This ... day of ... 19...

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji - Goa.

(Reverse)

(Page - 2)

No. of certificate: ... Date of passing Examination ... Bearer: ...

Date * and place of Birth showing Village, Taluka and Districts: ... Residence, showing Village, Taluka and District: ... Height: ...

Personal description, stating particularly any permanent marks or scars ... Signature or L. H. T. I.

Any Engine Driver who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B. — Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji - Goa.

This ... day of ... 19...

Captain of Ports, Panaji

* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as Engineer of an Inland Motor Vessel under Central Act I of 1917

To: ...

Whereas it has been reported to the Government that you have been found duly qualified to fulfil the duties of Engineer of an Inland Motor Vessel, I do hereby, in pursuance of Central Act I of 1917, grant you this Certificate of Competency.

This ... day of ... 19...

By order and in the name of the Governor of Goa.

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji - Goa.

(Reverse)

(Page - 2)

No. of certificate: ... Date of passing Examination ... Bearer: ...

Date * and place of Birth showing Village, Taluka and Districts: ... Residence, showing Village, Taluka and District: ... Height: ...

Personal description, stating particularly any permanent marks or scars ... Signature or L. H. T. I.

Any Engineer who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B. — Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

This ... day of ... 19...

Captain of Ports, Panaji

* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

(A) Name etc. of Applicant

Name in full 1	Permanent Address 2	Nationality 3
<hr/>		

Date of birth			Place of birth	
Day 4	Month 5	Year 6	Town/ Village 7	Country 8
<hr/>				

(B) Particulars of previous Certificate (if any)

Previous attempts, if any 9	Whether any application for Certificate of Competency is pending 10
<hr/>	

No. 11	Grade 12	where issued 13	Date of issue 14	C.D.C. No. 15
<hr/>				

(C) Certificates of Competency required

16
<hr/>

FORM No. 2

No.

No.

Name of
Applicant: —Examiner's authority for
delivery of a Certificate
of Competency to an Ap-
plicant who has passed his
examination.

Rotation No.:

(N. B. This authority is
subject to the approval of
Government of Goa.)Grade for which
Passed: —Authority given to
the above candidate to
obtain his Certificate
of Competency from the
Office of the Captain of
Ports, Panaji-Goa.

Date ... 19 ...

Examiner

Signature of Applicant.

Please deliver to the
above named person on his
complying with the Office

Rs....

The declaration marked (D) above was signed in
my presence and the Fee named in Division (E) has
been received by me.

Captain of Ports,

Regulations the Certifi-
cate of Competency for-
warded to you by the Go-
vernment of Goa.Dated at ... this ... day
of ... 19 ...

Signature of Examiner.

To

To

The Captain of Ports, The Captain of Ports,
Panaji-Goa. Panaji-Goa.

(D) Declaration to be made by Applicant

Take Notice: — Any person who makes, procures
to be made or assists in making any false representa-
tion for the purpose of obtaining for himself or
any other person a Certificate of Competency is for
each offence liable to be punished as for a misde-
meanour.I do hereby declare that the particulars contained
in Divisions (A), (B), (C) and (F) of this Form are
correct and true to the best of my knowledge and
belief; and that the PAPERS enumerated in division
(F) and sent with this Form are true and genuine
documents, given and signed by the persons whose
names appear on them.And I make this declaration conscientiously believ-
ing it to be true.

Dated this ... day of ... 198 ...

Signature of Applicant.

(E) Receipt for fee

Amount received 17	Date of Receipt			Office at which received 21
	Day 18	Month 19	Year 20	

Rs....

(F) List of Testimonials and Statement of service

(The Testimonials to be numbered consecutively according to the number given in Column 21 below)

No.	Ship's name	Horse Power	Port of Registry & Official Number	Service of Applicant Time in each ship				Repairs Lay up			Remarks	Initials of Verifier In Captain of Ports Office	35
				Rank	Date of Commencement	Date of Termination	Years	Months	Days	Months	Days		
22	23	24	25	26	27	28	29	30	31	32	33	34	3
Total Service Time served for which Certificates are now produced. Time served for which no Certificates are produced													

(G) Certificates of Examiners

Note:— Examiners should fill up Division (G) and in all cases as soon as possible forward this Paper alongwith testimonials and previous Certificates to the Captain of Ports, Panaji.

Date and Place of Verification			Certificate of Competency to be issued	
Date	Place	Form and Colour Vision	38	39
36	37			

(H) Personal Description of Applicant

Height		Complexion	Personal Marks of pecularities, if any	Colour of	
Feet	Inches	40	43	Hair	Eyes

I hereby certify that the particulars contained in Division (G) are correct.

This Form and the Testimonials are forwarded to the Captain of Ports.

Dated this day of 198 ...

(Signature of Examiner)

To

The Captain of Ports,
Panaji.

By order and in the name of the Governor of Goa.

Subhash V. Elekar, Under Secretary (Industries and Labour).

Panaji, 25th September, 1987.